

MONTHLY WEATHER REVIEW,

FEBRUARY, 1874.

WAR DEPARTMENT,

Office of the Chief Signal Officer,

DIVISION OF

TELEGRAMS AND REPORTS FOR THE BENEFIT OF COMMERCE AND AGRICULTURE

The atmospheric changes during the month of February appear to have been controlled to an unusual degree by the influence of the nightly radiation, especially that between the midnight and morning reports. Illustrations of this are found in the rapidity with which areas of rain and snow have extended during those hours, and of which a striking instance is found in the heavy snow-fall of the morning of Wednesday, February 25. At the preceding midnight, rain apparently prevailed from Norfolk to Cairo and southward, while cloudy weather extended over the Middle and Atlantic States. The northern limit of the area of rain had moved northward 250 miles, between 4:35 p. m. and 11 p. m., of the 24th, but by 7:35 a. m. of the 25th, an area of snow prevailed for about 350 miles further northeast, and extended again another 350 miles by 4:35 p. m. of the same day. This rapid extension northward was apparently the consequence of direct radiation during the night, in consequence of which a feeble barometric depression was caused in the Ohio valley, while storm No. XII was drawn all the more rapidly northwestward toward the Middle Atlantic coast.

STORMS.

An unusually large number, namely, twenty-two, of barometric depressions have been noted during February, but of these only the following twelve have seemed worthy of representation on the storm map—most of the others being subsidiary to these, or only appearing on the extreme limits of the weather map. It will be seen that the, for February, unusual number of four important storms, of which two were violent hurricanes, have moved up the Atlantic coast, while three have also pursued a parallel course on the west side of the Alleghanies, and but three have been traced directly eastward over the extreme northwestern Territories and the Lake region.

The storms peculiar to the Gulf Stream would seem to have pursued tracks lying, on the average, somewhat west of their usual course.

This distribution of the storm-tracks is a sufficient indication of the peculiar character of the weather for this month, and the study of the reports received by mail from the Bermudas, as well as of the logs of vessels, shows the extreme importance of these islands as an outpost for the anticipation of such storms as advance northward upon the New England coast.

I. This storm was apparently in Texas on the 31st of January, and on the 1st of February was in Louisiana, and was already followed by the customary cold weather on the Texas coast. In its advance northeastward to the Lower Lakes, it was preceded by

a high barometer and cold northeast wind in the Middle and East Atlantic States. This mass of cold air seems to have underrun and up-lifted the warmer air of the South Atlantic States, and extended as a cold northeast rain southward to Florida by the evening of February 2d. While this low barometer was, on the 2d, in the Ohio valley, another storm-centre existed between the Atlantic coast and the Bermudas.

II. This developed on the 2d, in consequence of the heavy precipitation in Georgia and Florida, caused by the north winds previously alluded to. After passing eastward off the land, it followed the trend of the coast, as shown by the Bermuda reports, until it passed near Nova Scotia on the 4th. The amount of barometric depression at its centre appears to have slowly increased in the course of its progress:

III and IV. This disturbance appears first in southwestern Texas, and may have owed its origin to the westward flow, up the slope of the plains of Texas and northern Mexico, of the surface air forced from the Gulf of Mexico by the high pressure then existing in the Gulf and Southern States. Throughout the 3d and 4th instant, slowly increasing cloudiness was reported from the Western Gulf coast, while as usual the upper clouds moved toward the centre of higher pressure. There are no reports to show whether there also existed on the west of the Mexican Cordilleras any area of low pressure that would further intensify the action going on in Texas. The storm-centre having in its eastward course left Texas on the 5th, was immediately followed by a moderate "Norther," and while itself passing rapidly northward to the Ohio valley, gave rise on the 6th to southerly winds and heavy rain or snow in the South and Middle Atlantic States, over which there also appeared several temporary barometric depressions—one of which developed by midnight of the 7th to a well-marked storm on the coast of Virginia.

The growth of No. IV was attended by the gradual disappearance of the original storm-centre. Southwest winds prevailed at the Bermudas while it was near Cape Hatteras; northerly winds, with rain, prevailed before and after.

V. This storm first appears on the map as a region of rain on the 7th of February southwest of Florida. There was at this time a cold northerly current flowing over Louisiana and Northern Florida, and it seems not improbable that this contributed to the formation in the southeastern part of the Gulf of Mexico of the rainy area attending the development there of the low barometer. After crossing the peninsula of Florida, the storm-centre moved northeastward, not far from the South Atlantic coast, preceded by a northeast gale at Capes Henry and Hatteras. On the morning of the 11th, this storm-centre appears quite near to Cape Breton, where the barometer was at that time reported 28.78, being the lowest that has occurred during the month. This cyclone was productive of great destruction upon the sea, as shown by the reports that have come to hand of over one hundred vessels, collated from the columns of the New York Herald. Of these, the following give the approximate places in which they met the storm:

On the 8th—

- S. S. "Moro Castle" E. of Frying Pan Shoals.
- Schr. "Ricardo" lat. 31.00, lon. 79.00.
- Brig "E. H. Flynn" lat. 29.00, lon. 79.20.
- S. S. "Etna" 200 miles S. of Hatteras.

On the 9th—

- S. S. "Montgomery" S. of Cape Hatteras.
- Sch. Jos. W. Wilson" lat. 31.15, lon. 79.20.
- Brig "Isabel Cain" lat. 34.30, lon. 69.30; barometer fell to 28.80.

On the 9th—

Bark "Saide" lat. 32.00, lon. 70.00.
 Brig "Hail Columbia" lat. 33.48, lon. 73.16.
 Bark "La Platte" lat. 32.00 (?), lon. 67.15.

On the 10th and 11th—

Bark "Jason" lat. 38.00, lon. 68.00

On the 11th and 12th—

S. S. "Weser" lat. 43.00, lon. 56.00.

On the 12th—

S. S. "Maas" lat. 45.00, lon. 48.40.

On the 13th—

S. S. "Wyoming" 2 days W. of Liverpool, February 1st to the 13th.
 S. S. "City of Montreal" 2 days W. of Liverpool February 11 to the 13th.

VII. During the evening of the 11th and morning of the 12th, the barometer fell, with light rain, in California and Oregon. This was followed on the 12th by rapid fall, with southeast winds throughout the country immediately east of the Rocky mountains, and the formation of a long elliptical area or trough of low pressure which soon broke up into three or more circular areas of which the most important has been indicated as No. VI. The pressure in Oregon, however, continued quite low and falling, showing that the main depression was moving slowly northeastward toward British Columbia. By the evening of the 13th, this had finally passed into Montana, but appears not to have had there the characteristics of a severe disturbance. It was central on Lake Superior on the morning of the 15th, and on the Gulf of St. Lawrence on the 17th. The barometer was quite low at the Bermudas on the 16th, 17th and 18th, and was followed by north-easterly winds, low temperatures and heavy rain.

VIII. The morning map of the 16th shows a decided depression west of Texas, which probably originated west of the Cordilleras, possibly in the equatorial portion of the Pacific Ocean, as Mr. Redfield has shown to be frequently the case with the storms that arrive on the Mexican and California coasts. This storm-centre moved quite slowly eastward, influenced no doubt by the area of moderately high barometer and cold air over the Lake region and Ohio valley. On passing beyond the coast of Georgia, it seems to have given rise to at least two areas of special precipitation and possibly low pressure, one of which existed in Florida on the morning of the 18th, while the other was east of South Carolina. The Bermuda reports indicate that both of these passed northeastward without important development.

IX. On the 16th and 17th, the falling barometer, cloud and rain at San Francisco and Portland, Or., indicated the approach of areas of low pressure of which the one represented as No. IX passed within the cognizance of the office, while others kept to the northward. This storm-centre apparently passed eastward over the northern part of California into Nevada and Idaho, where it was central on the 18th, and there coöperating with a smaller storm-centre to the northward, produced what threatened on the morning of the 19th to be an unusually severe disturbance; this however passed northeastward over Lake Superior, and was only especially notable by reason of the northwest gales in Minnesota and Dakota. The steady southerly winds induced over the Lower Lakes, Middle and East Atlantic States brought steady light rains to those sections.

X. While the previous storm-centre was, on the 19th, in the extreme Northwest, the induced southeasterly winds in Texas prepared the way for the formation of an independent area of precipitation and low pressure in Texas, the existence of which was, as usual, determined by the nightly radiation; its centre on the morning of the 20th was probably in Northwestern Texas. The rain-area extended very rapidly by midnight over

the Ohio valley to Western Pennsylvania. The remarkable contrasts of temperature noted in a subsequent portion of this review formed the most notable features of the storm-centre which soon seemed to die away.

XI. The belt of isotherms above alluded to as originating on the dissolution of storm No. X seems to have lasted until the development of No. XI disturbed its arrangement. The passage of No. IX from the Pacific coast had been followed on the 21st by the area of highest barometric readings that appeared on that coast during the month. The cold northerly winds from this area of high barometer prevailed over the Lower Missouri, Upper Mississippi and Ohio valleys, and in Texas on the morning and afternoon of the 21st; apparently there formed in consequence some precipitation in Southern Texas and off the Texas coast, for by midnight the coast winds had veered to south and east with rising temperature. During the whole of this night the rainfall was quite large in Tennessee, and the area of lowest pressure after moving into that State extended simultaneously and rapidly to the northeast and northwestward, and on the morning of the 23d was represented by two depressions, respectively, over Upper Michigan and the Lower Lake region. The former disappeared from the cognizance of the signal stations, and the latter passed over the mouth of the St. Lawrence river.

XII. The cold northerly winds attending the high barometer that followed the preceding storm seem to have underrun the warmer and moister air of the Gulf and the Atlantic, between latitudes 25° and 30° , so that already on the morning of the 23d, the Texas "Norther," and its feebler representative in Alabama were attended by the invincible upper southerly cloud-bearing current moving toward the centre of low temperature and high barometer. During the 24th, there appeared traces of an incipient storm-centre in the northern portions of the Gulf, while cold north and northeast winds, with sleet, rain and high barometer, prevailed on the South and Middle Atlantic coasts, probably indicating the simultaneous development, in a similar manner, of a storm-centre at some distance east of the Carolina coast. On the 25th, this latter centre had moved on to the coast of New Jersey, while the depression in the Gulf of Mexico had moved eastward over the Florida peninsula and disappeared, possibly uniting with its predecessor.

The storm-centre then advanced rapidly northeastward along the New England coast; it was in the afternoon of the 26th east of Cape Breton. This storm appears to be the same as that experienced by the steamer "Donau," which met a violent hurricane shortly before reaching New York on the 27th. The same hurricane was also met by the steamships "Russia," "City of Dublin," "Wisconsin" and "Andes," and the latest report received concerning it is from the steamship Pennsylvania, which experienced a violent hurricane at midnight of the 27th.

CAUTIONARY SIGNALS.

There have been displayed during the month at stations in the United States ninety cautionary signals, while to the Canadian stations forty-two storms warnings have been sent. Of these latter the tri-daily weather maps show with more or less certainty that twenty were verified by the storm-winds following within twenty-four hours after the observations were made upon which the warnings were based. Of the remaining twenty-two signals, eighteen appear not to have been verified, while two orders, classed as late, were sent after the winds had become dangerous, because it was anticipated that these would so continue for some time; concerning the verification of two others, no informa-

tion is at present available. Of the ninety signals displayed at stations in the United States twenty-three are classed as late, the orders having been issued immediately on the receipt of the news of unexpected strong winds; other twenty-three are reported by the observers as not verified at the station, but of these twelve appear to have been verified within one hundred miles thereof, leaving fifty-six signals or sixty-two per cent. verified. Three cases are reported in which dangerous winds prevailed for a short time without the display of signals.

BAROMETRIC PRESSURE.

The isobars given on Map No. 2 show that the area of high pressure on the Pacific Ocean has encroached upon the coast of California; on the other hand, the area of high barometer over the Atlantic Ocean has apparently extended somewhat further eastward than usual. The lowest pressure is found on Lake Superior.

TEMPERATURE.

The temperature during this month has been about the average of many years past, the most decided departure being in Minnesota, Wyoming and Colorado. On the 24th, in the latter Territories, the thermometer indicated the lowest temperature ever recorded there, it being -24° at Cheyenne, -17° at Colorado Springs, -9° at Denver and 0 at Santa Fe.

The isothermal lines for the month are given on Map No. 2. In drawing these, some use has been made of the observations made by the corps of voluntary observers reporting to the Signal Office.

The southeastern side of a region of cold air and high barometer, generally presents cases of extreme contrasts of temperature, and such have been quite frequent during this month. The most remarkable instance was noted on the afternoon of February 22d, and it is worthy of special attention, since similar cases have occurred but three or four times during the last three years. On the date in question a line drawn northward through Louisiana to Vicksburg, thence northeast to Baltimore and thence southeast to the Atlantic coast, separated the area of cold northeast winds and rain on the northward from that of warm southwest winds to the southward. This belt of great thermal contrasts had existed on the 20th, and extended slowly eastward until the 23d.

The greatest contrast recorded is found in the Middle Atlantic States, although probably parallel cases occurred at other places, where the Signal Office has no stations. At New York the temperature of 41° , with northeast winds is first recorded on the 21st at 7.35 A. M., and continued uniformly until the 23d 7.35 A. M. At Philadelphia there were northeast winds, temperature 44° on the 22d 7.35 A. M., and continuing uniformly until the 23d 7.35 A. M.; at Baltimore, northeast winds, temperature 58° on the 22d 11 P. M., this is the only northeast wind reported at Baltimore. During the three days in question Baltimore, as also always Washington, experienced only warm southwest winds.

On the 21st, 4.35 P. M.

On the 22d, 4.35 P. M.

On the 23, 7.35 A. M.

New York, wind E, temp. 51° . Philadelphia, wind, NE, temp. 47° . Philadelphia, wind, E, temp. 41° .
Philadelphia, wind SW, temp. 67° . Baltimore, wind SW, temp. 73° . Baltimore, wind, SW, temp. 62° .

It thus appears that at these stations, as also along the entire belt from Louisiana to New Jersey, cold north and east winds met, and perhaps, to a slight extent, underrun the warm south and west winds, the contest between the two being maintained with great uniformity for 48 hours. The examination of the movement of the upper clouds, as far as they could be observed when the belt was most distinctly marked on the afternoon of the 22nd, shows that while the crowded isothermal lines bounded the regions of north and south surface winds, they also bounded the regions, respectively, of the northeast and southwest upper currents, into which directions the surface winds were respectively turned after their ascension. The heaviest rain seems to have been falling on the north side of the dividing belt at the time of each report. As has been mentioned in the study of the Storm No. XI, this belt of isotherms disappeared on the development of that storm-centre.

PRECIPITATION.

The monthly chart of precipitation shows that there has been a very great excess in the South Atlantic States, and a decided excess in the Western Gulf States and the Ohio valley. In compiling this chart use has been made of the reports of voluntary observers, in addition to those of the Signal Corps.

On the 21st and 22d, at Nashville, there fell 5.96 inches in 36 hours, being the heaviest rainfall ever recorded there.

RIVERS.

The Missouri river at the end of the month was at about the same height as at the beginning, both at Leavenworth and at St. Louis, having in the interval risen and again fallen from one to three feet. The Ohio fell, with but slight interruption, until the 13th of the month, when a sudden rise of about eight feet occurred in the upper portion of the river, producing by the 20th a rise of fifteen feet at Cincinnati. The extensive rain of the 23d and 24th, throughout the Ohio valley, caused a very general rise, which was especially marked at Nashville. At the close of the month the river stood at Cincinnati, Louisville and Cairo from eight to twelve feet above its position at the middle of the month. The Upper Mississippi has varied but slightly, and at the close of the month averaged about one foot lower than at the beginning; below St. Louis it has varied considerably, and at Cairo, Memphis and Vicksburg closed from four to six feet higher than at the beginning of the month. The wave of high water, which, on the 28th, was passing Cairo and Memphis, had not at that time reached Vicksburg.

ICE IN RIVERS, &c.

During the month the ice has averaged sixteen inches in thickness at Dubuque, and twenty-one and three-quarters at La Crosse. At Keokuk the river was clear of ice on the 11th and 27th, but full of thin ice at the other days of observations. At Detroit on the 12th the river was almost free of ice. At Toledo the ice broke up on the 15th. At Buffalo the river and lake continued frozen during the month. At Rochester at the beginning of the month the ice was from six to eight inches thick, and at the close from twelve to eighteen inches.

TEMPERATURE OF THE WATER.

But five stations have sent reports of the temperature of the water in the rivers. The ranges are as follows:

	<i>Maximum.</i>	<i>Minimum.</i>		<i>Maximum.</i>	<i>Minimum.</i>
Leavenworth,	33°	32°	Montgomery	61°	47°
Nashville,	53	39	Shreveport,	57	48.5
Knoxville,	51	41			

At stations on the Atlantic and Gulf coasts the ranges have been as follows:

	<i>Maximum.</i>	<i>Minimum.</i>		<i>Maximum.</i>	<i>Minimum.</i>
Galveston,	65°	51°	Norfolk,	56°	37°
Mobile,	60	52	New York,	36	31
Jacksonville,	66	57	Wood's Hole,	34	29
Wilmington,	54	42	Portland, Me.,	34 (?)	29

FROSTS.

Frosts are reported at the following stations:

On the 3d, Shreveport; 4th, Cairo; 5th, Savannah; 8th, Shreveport; 10th, Montgomery; 24th, Shreveport.

SOLAR AND LUNAR HALOS.

Solar or Lunar Halos have been recorded as follows: on the 2d, Santa Fé and Oswego; 4th, Atlantic City and Long Branch; 9th, Santa Fé; 10th, Eastport; 11th, Eastport; 14th, Washington; 19th, Eastport and Breckenridge; 20th, Atlantic City; 21st, Breckenridge and Duluth; 22d, Wytheville and Breckenridge; 24th Cairo, Escanaba, Dubuque, Norfolk, Eastport, Albany, Barnegat and St. Paul; 25th, St. Paul, Breckenridge and Omaha; 26th, Duluth, Marquette, Buffalo, Oswego, Sandy Hook, Wood's Hole, Albany, Barnegat, Norfolk, New Haven, Philadelphia, Atlantic City, Lynchburg, Rochester, Grand Haven and Washington; 27th, Keokuk, Davenport, Omaha, Dubuque and Washington.

POLAR BANDS.

Notable arrangements of cirri-clouds, in what are called Polar Bands, were recorded as follows: On the 5th, at St. Paul; 8th, Atlantic City; 14th, St. Paul and Washington; 21st, Norfolk; 23d, Sandy Hook; 26th Norfolk.

AURORAS.

Auroral displays have been generally quite faint. They have been observed at the following stations: On the 5th at Burlington, Eastport, Boston, Albany, Long Branch, Alpena and Rochester; 7th, Eastport, Marquette and Alpena; 14th, Eastport, Burlington, Rochester, Erie and Breckenridge; 17th, Burlington, Alpena and Marquette; 18th, Boston, and at Lake City "an anomalous luminous appearance;" 20th, Eastport.

ATMOSPHERIC ELECTRICITY.

Remarkable earth currents were noted on the 25th at Breckenridge. Thunder and lightning storms were experienced on the 5th, at Galveston; 6th, Mobile; 17th, Montgomery, Charleston and Augusta; 21st, Cairo and Shreveport; 22d, Shreveport; 28th, Atlantic City.

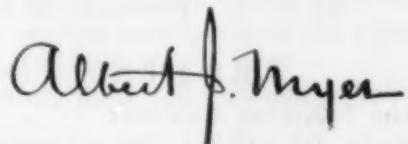
MISCELLANEOUS.

An Earthquake was experienced at Eastport at 10:50, p. m., on the 27th. The trembling lasted three or four minutes.

The migration southward of flocks of wild ducks was noted on the 11th at St. Louis, and 24th at Morgantown.

A bright meteor was observed February 1st, at Atlantic City.

PUBLISHED BY ORDER OF THE SECRETARY OF WAR.



Brig. Gen. (Bvt. Asst^l) Chief Signal Officer, U. S. A.

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WAR DEPARTMENT

SIGNAL SERVICE U.S.A.

DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT
TRACKS OF STORM-CENTRES FOR

IX

VII

III

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VIII

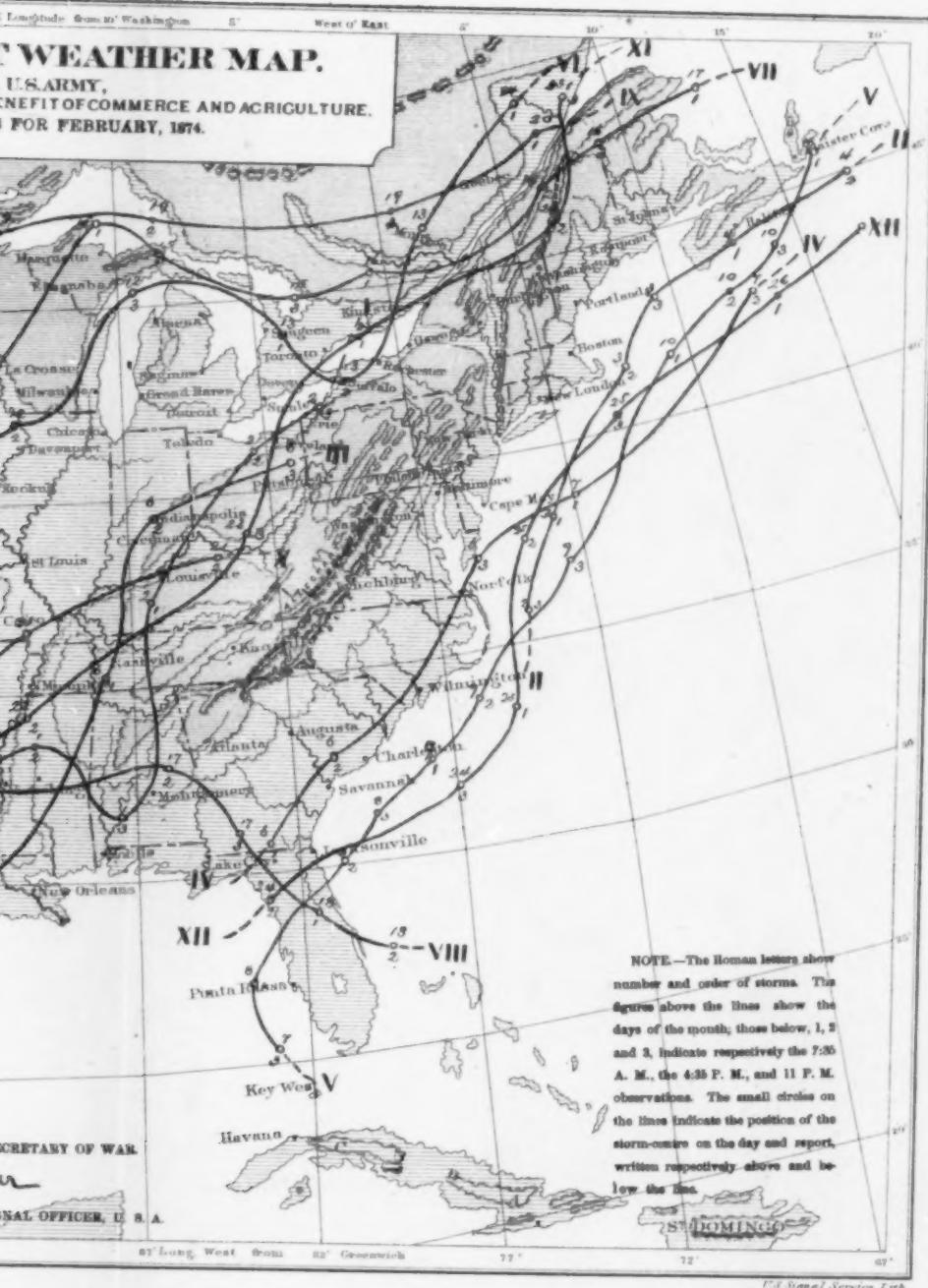
XI

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Albert J. Myer

BREV. GEN. (BVT. ABRG'D) CHIEF SIGNAL OFFICER

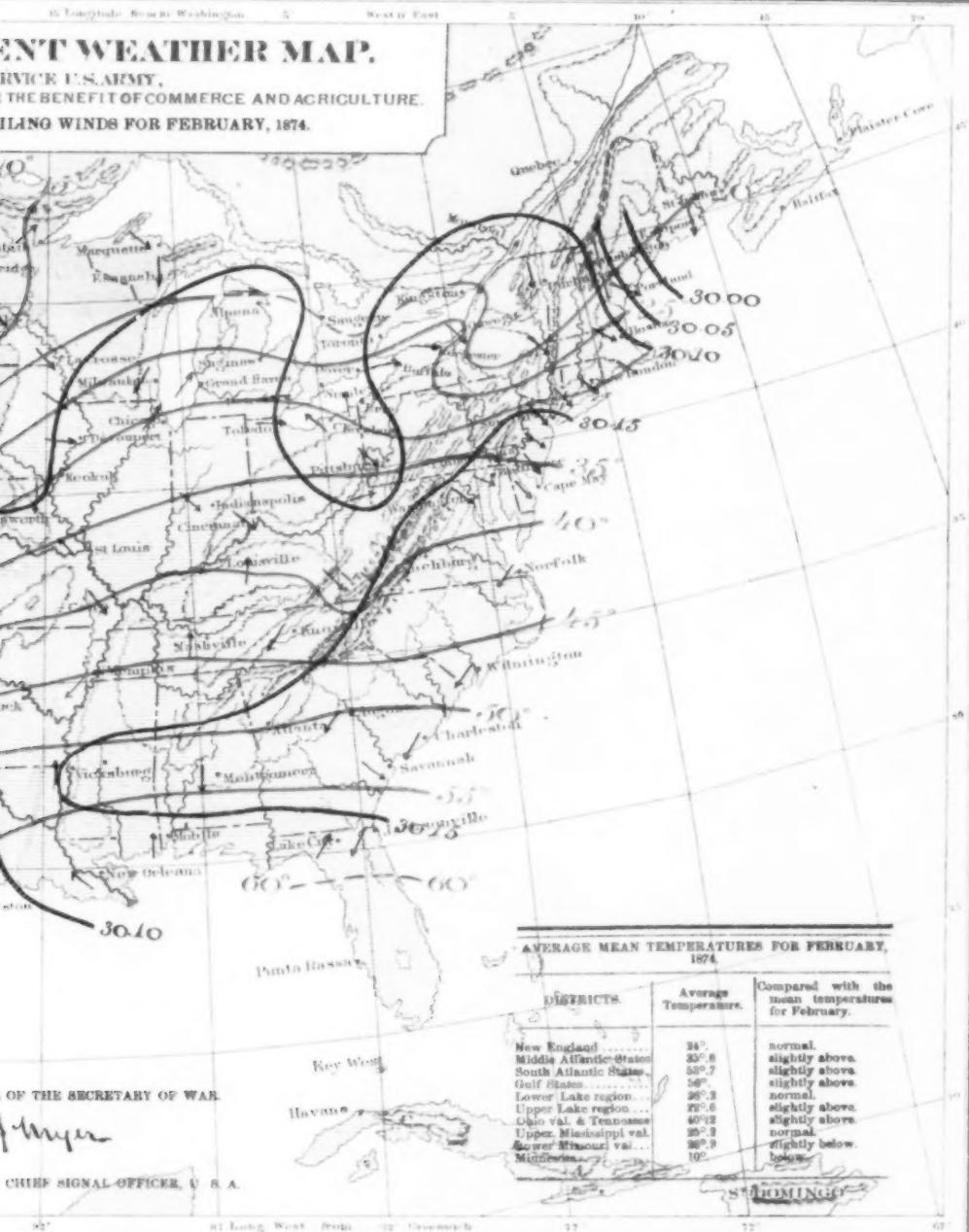




No. 2.



В. РЕТЕР. РИЧАРД-ЛІНСКІДІНГЕН. АКАДМІЧНИК. II С



WAR DEPARTMENT W

**SIGNAL SERVICE, U.S.
DIVISION OF TELEGRAMS AND REPORTS FOR THE BENEFIT
PRECIPITATION CHART FOR FEBRUARY**

